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mechanical cleanliness in the apartment depend for excuse upon their presence.

A word about dirt and mechanical cleanliness. "Dirt" means various things to the housewife, the sanitarian, the surgeon, the chemist, and the bacteriologist, depending on its composition and location. A surgeon might operate successfully in a room which a housewife considered untidy, but not with a knife which she would pass as clean. A bacteriologist might carry out successful research in a cellar which a dainty housewife would hesitate to enter, but not by using glassware cleaned by her methods. The sanitarian must appreciate the various standpoints from which "dirt" is viewed, and must balance that cleanliness which is practical against what is theoretically desirable. But if his viewpoint is sufficiently inclusive, he will contend that grossly visible dirt, in the sense of the housewife, is always prejudicial to sanitary conditions. Even if the dirt does not of itself contain disease germs, its presence conduces to practices which are menaces to health. Promiscuous spitting on the floor is admittedly a dangerous practice. Will a person (capable of doing it at all) be more apt to spit on the floor of a neat apartment or on that of a dirty, ill-kept one? Will householders be more apt to dump rubbish and filth on the muddy banks of a black, foul-smelling stream, or on the grassy slopes of a clear and wholesome river? There are incorrigibles, it is true, with whom the law must deal, but the general run of our citizens are susceptible to their surroundings, and respond to a neat, well-cared for environment, by improving their habits and practices, and incidentally their sanitary condition as a body.

It behooves those who are concerned with the handling and accommodation of employees and patrons, especially in large numbers, to subject the "sanitary" measures which they employ to the critical scrutiny of common sense, aided here and there at the technical points by expert information. Otherwise they are sure to lose in the end, to the advantage of more progressive competitors, and (since there is no reason to impute to the business man a disproportionate lack of the altruistic impulse) they will be missing a great opportunity for inculcating the lessons of genuine sanitation.

PURE DRUGS AND THE PUBLIC HEALTH.

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Food and drug laws are generally recognized as being economic measures designed to prevent dishonest practices or gross adulteration and thereby secure to the purchaser an equitable return and the assurance that the food or drug product purchased will be true to

name or nature as represented by the seller. The pure drug features of these laws, however, combined with the laws designed to restrict the practice of pharmacy to specially trained and capable individuals, also have, or should have, an evident bearing on public health in that the purchaser is led to assume that the licensed druggist is directly responsible for the character and purity of the drugs sold.

The methods adopted for enforcing these laws in the past have not always been in accord with the securing of the best results from a public-health point of view, and even in States where the control of laws regulating the nature and purity of drug products is in the hands of the State board of health the tendency has been to discourage rather than encourage adequate and satisfactory control of all medical supplies.

Some indication of the nature and variability of the products sold as medicine may be had from a comparative study of Hygienic Laboratory bulletins embodying in the form of annual compilations a "Digest of Comments on the Pharmacopœia of the United States and on the National Formulary."

These bulletins, though not compiled especially for this purpose, reflect from year to year the available material regarding published activities of food and drug laboratories so far as they relate to pharmacopœial or official drugs and preparations, and the sum total of the reported activities well indicates the general trend of the trade so far as it is influenced by the present-day method of drug-law enforcement.

A compilation of the analytical reports embodied in previously published bulletins shows that out of a total of more than 9,000 samples of 6 pharmacopœial preparations reported on during the years 1907 to 1911, inclusive, more than 4,000, or approximately 45 per cent, were found to be not in compliance with the requirements of the Pharmacopœia. That approximately this same ratio still holds is evidenced by the available annual reports of State boards of health and State food and drug commissioners, abstracted in Hygienic Laboratory Bulletin No. 93, embodying a Digest of Comments on the Pharmacopœia of the United States and on the National Formulary for the calendar year ending December 31, 1912. Among the reports reflected in this bulletin we find that the chemist of the Indiana board of health states that of 365 samples of drugs analyzed 156, or 42.7 per cent, were illegal in that they did not comply with the standards or requirements. The food and drug commissioner of South Dakota reports that of 326 samples examined 118, or 36.3 per cent, were not passed, and in New Hampshire of 421 samples of drugs examined by the chemist of the board of health 180, or 42.8 per cent, were not conformable.

Further evidence regarding existing conditions will be found in the accompanying table showing the total number of samples of 26 drugs

and preparations reported on during 1912, the number that were rejected or found to be illegal, and the number of reporters on each individual article.

Table showing reported results of analysis of samples of 26 official articles—a compilation of data included in Hygienic Laboratory Bulletin No. 93.

	Num- ber of re- porters.	Number of samples.		Per cent of samples rejected.
		Exam- ined.	Rejected.	
Alcohol.....	7	98	47	47.9
Ammonia, aromatic spirit of.....	5	116	78	67.2
Ammonia, water.....	4	19	11	57.8
Asafetida.....	10	256	200	78.1
Belladonna, tincture of.....	3	14	6	42.8
Camphor, spirit of.....	19	802	423	52.7
Camphor, liniment of.....	8	597	99	16.5
Ferric chloride, tincture of.....	7	680	219	32.2
Ferrous iodide, sirup of.....	8	549	88	16.0
Ginger, tincture of.....	9	74	30	40.5
Iodine, tincture of.....	18	984	474	48.1
Lard.....	8	265	53	20.0
Lemon extract.....	10	252	100	39.6
Lime water.....	10	635	98	15.4
Linseed oil.....	12	367	138	37.6
Olive oil.....	13	912	69	7.5
Opium, camphorated tincture of.....	5	91	30	32.9
Opium, tincture of.....	11	252	125	49.6
Peppermint, spirit of.....	14	270	139	51.4
Solution of hydrogen dioxide.....	13	1,026	90	8.7
Solution of potassium arsenite.....	7	570	128	22.4
Sulphur.....	6	70	35	50.0
Sweet spirit of niter.....	22	609	336	55.1
Turpentine, oil of.....	8	639	132	20.6
Vanilla.....	12	286	116	40.5
Witch hazel.....	5	91	24	26.3
Total.....		10,524	3,288	31.2

As an object lesson this table is well worth studying from various points of view. Not the least important in this connection is the suggestion that, despite the apparently large number of samples examined, the present-day method of enforcing food and drugs laws is hopelessly inadequate so far as offering to control, even in a moderate degree, the nature and purity of drug products as they reach the consumer.

The limitations imposed by the present method of enforcing the drug feature of food and drugs laws is well illustrated by a table recently published by L. P. Brown, food and drug commissioner of Tennessee (*Am. Food J.*, 1912, v. 7, July, p. 9), showing the number of States in which food and drugs laws are actually being enforced, the number of employees in each State, and the number of samples analyzed in one year. This table states that no less than 44 political divisions of the United States make some attempt to enforce laws of this type. The total number of employees recorded is 465, an average of but 10 to each State. The total number of samples examined during one year is given as 83,498, and from a study of several annual reports it is fair to assume that not more than from 20 to 25 per cent of these samples represent drug products or products used as drugs.

When one remembers that in the United States alone there are no less than 40,000 retail drug stores, and that each one of these stores has in stock from 1,000 to 20,000 separate articles used or offered for use as medicine, the futility of endeavoring to control or even to seriously influence the nature and purity of products sold as medicines by an occasional examination of one or more preparations is at once apparent.

That the present-day method of enforcing food and drugs laws is efficient in some directions must be admitted, and the possibilities in this line are well indicated in the above table. Given a product that is more or less easily examined by chemical means and for which a reasonably high standard has been established by the Pharmacopœia, by statute, or by regulation, little or no difficulty is encountered in materially improving the conditions under which such an article is marketed, and thus securing for the consumer a reasonably reliable product if he will but exercise ordinary care in making his purchases from reputable dealers.

One instance of this type is olive oil, which up to a comparatively few years ago was considered to be among the most adulterated of all commercial products. This oil, though largely if not preponderatingly, used as a food product, is also of value as a medicine and can now be classed among the generally pure articles used for medicinal purposes.

Another article that has been materially improved through systematic examination and accompanying publicity is "solution of hydrogen peroxide." This preparation is also used quite extensively in the arts as a bleaching material, and formerly it was quite common to find the comparatively impure and usually weak technical product on sale in drug stores for medicinal purposes. Improved methods of manufacture, the use of preservatives, and the exercise of a little additional care in keeping the preparation have evidently combined to change this preparation from one that was considered to be uniformly impure to one that complies fairly well with the spirit though not the exact letter of the present pharmacopœial requirements. Disregarding the frequent presence of a preservative, only 8.7 per cent of the preparations examined were found to be deficient in strength or contaminated. This figure, when one considers the unstable nature of the product, compares very favorably, indeed, with the low percentage (7.5 per cent) of samples of olive oil rejected during the same period.

Oil of turpentine is another product that is rapidly being improved, and the economically closely related linseed oil, while still above the general average for all of the products reported on during 1912, also evidences a marked improvement over previously reported conditions. These two products are very widely used for technical pur-

poses and occupy rather an anomalous position as drugs. The frequency with which they are now found to be of inferior quality is no doubt due to the fact that little or no attempt has as yet been made to regulate their identity or purity for technical purposes, and because of the much lower price of the impure technical products they are very frequently sold in place of the official, or pharmacopœial, articles for medicinal use.

The opposite of these rather promising conditions is shown in connection with asafetida, a drug product of somewhat uncertain value that is, nevertheless, used quite extensively, largely perhaps because of its penetrating odor and disagreeable taste. The pharmacopœial requirements for this drug are unnecessarily high and the chemical tests for identity and purity quite inadequate. It is, therefore, not at all surprising to learn that more than 78 per cent of the samples of asafetida examined did not comply with the requirements of the Pharmacopœia.

This drug is, however, but one of a number of articles that are of uncertain medicinal value, are difficult to control from a chemical point of view, and are more frequently found to be below standard than above. This one fact, that there are hundreds of more or less widely used drugs for which we have little or no data on which to base a chemical control of the finished preparation, serves to further illustrate the difficulty of exercising any adequate control of medicinal preparations through a city, State, or Federal laboratory.

That some form of control is essential is evidenced by the head of one of the leading drug houses in England, who is reported as saying that the thousands of samples of crude drugs examined annually in his laboratories yield abundant evidence to show that constant and efficient control is necessary if the purity of medicinal products is to be maintained and progress achieved on the lines of modern science.

The reports of the several officials intrusted with the enforcement of laws relating to the production and sale of drugs have emphasized time and again that much of the material that is now being sold as medicine in this country is either directly harmful or absolutely useless, and that from a public-health point of view considerable progress is necessary before the consumer is as adequately safeguarded as he should be.

It is generally recognized that once a seal is broken, a package opened, or a cork drawn, the manufacturer can no longer be held responsible for the content of the package, and, quite irrespective of the nature of the medicine, the pharmacist in dispensing a portion of an original package assumes all responsibility for the nature and purity of the article.

That this responsibility of the pharmacist is as yet not appreciated and that much progress must be made in the enforcement of existing

laws before the public is as adequately protected as it should be, or has a right to expect, is evidenced by the shortcomings of the pharmaceutical preparations included in the table referred to above, particularly those preparations usually made on a comparatively small scale in the retail drug store. From the point of view of State or national officials, these preparations offer the most serious difficulties in the way of control, through the intervention of Federal or State laboratories, and yet they are of considerable importance from a medical point of view in that they include some of the most widely used medicines we now have. It has been well said that medicine, particularly the use of medicines, as a science can make little or no progress until physicians know more of the nature and composition of the articles they use as medicines and of the action or influence of these articles on the healthy as well as the diseased organisms.

How little actual reliance can be put in the average drug preparation at the present time will be appreciated when we learn that fully 50 per cent of such widely used articles as aromatic spirit of ammonia, spirit of camphor, tincture of iodine, tincture of opium, spirit of peppermint, and spirit of nitrous ether have been found to be adulterated or below standard.

Table showing variations in the active principles of drugs reported during the calendar year ending Dec. 31, 1912.

[A compilation of data included in Hygienic Laboratory Bulletin No. 92.]

	Num- ber of re- porters.	Num- ber of sam- ples.	Mini- mum per cent.	Maxi- mum per cent.	U. S. P. requirements.
Belladonna leaves...	5	144	0.175	0.563	0.3 per cent mydriatic alkaloids.
Belladonna root.....	6	115	.11	.780	0.45 per cent mydriatic alkaloids.
Guarana.....	3	41	3.720	5.16	3.5 per cent alkaloidal principles.
Hydrastis.....	8	114	2.3	4.85	2.5 per cent hydrastine.
Hyoscyamus.....	4	120	.043	.234	0.08 per cent mydriatic alkaloids.
Ipecac.....	10	253	1.24	2.75	1.75 per cent ipecac alkaloids.
Jalap.....	6	173	3.87	21.76	7 per cent total resin.
Stramonium.....	4	127	.14	.470	0.25 per cent mydriatic alkaloids.

Some additional argument for more adequate control of the identity, purity, and strength of materials used as medicine is offered by the table including a compilation of data showing the variability of well-known and widely used drugs which can, in a measure at least, be controlled by assay and analysis. Preparations of these drugs, on assay, are less frequently found to be above than below standard and even a standardized preparation is far from being permanently so.

As is well known, all pharmaceutical preparations and many drugs and chemicals deteriorate on keeping, and this deterioration is not so much dependent on time alone as on a number of accompanying factors, as light, heat, atmospheric conditions, and the general lack of care or technical knowledge in storing the various substances. All in

all, it is safe to assert that no matter how excellent a drug or preparation may be when it leaves the producer there are many possibilities for it to become worthless, if not positively dangerous, through carelessness or neglect before it reaches the consumer.

The general subject of changes produced in a drug because of deterioration due to improper keeping has received altogether too little attention and it is not generally recognized that many of the formerly well known drugs have probably been discredited because of their failure to accomplish the object for which they were administered, a failure perhaps largely due to some form of contamination or to decomposition not recognized by the dispenser.

In addition to the changes in drugs that may be produced by heat, by the constituents of the air, by ferments, or by microorganisms, some recent observations by Neuberg, of Berlin, suggest that nearly all types of organic compounds acquire a pronounced photosensitive-ness when they are mixed with inorganic compounds. Iron salts, it is said, provoke such changes most strikingly, and it is quite possible that otherwise innocuous materials may thus be converted, in part at least, into decidedly harmful compounds.

In addition to this possible deterioration of medicaments, which can be averted, to a considerable degree at least, by constant care and watchfulness, there are a number of other factors that should be taken into consideration in connection with the dispensing of medicines to the consumer. Not the least important of these several factors is the accuracy and also the sensitiveness of scales, weights and measures. On page 43 of Hygienic Laboratory Bulletin No. 93 will be found several references that bear out this assertion. One observer found that not one of 36 graduates examined was correct. Some were better than others, but all were bad. In the State of Kansas nearly one-half of the prescription weights examined were condemned, and of the 718 prescription scales examined 195 were found to be unfit for use.

The inability or unwillingness of retail druggists to assume proper responsibility is further evidenced by the recommendation of one man to use ready-made tablets in place of weighing out small quantities of potent drugs. The fallacy of this advice has more latterly been emphasized by the fact that compressed as well as other tablets, even under most favorable conditions, may vary from 10 to 30 per cent from the quantities claimed. Under conditions not so favorable even greater variations have been observed, and in cases where tablets have been made to sell at inordinately low prices it has been found that expensive chemicals were present only in traces sufficient to give qualitative tests.

In conclusion it may be reiterated that the more evident shortcoming in the present-day enforcement of pure-drugs laws is the general failure to properly place the responsibility for the nature,

kind, and purity of the medicines supplied to the consumer where it belongs. This shortcoming is being corrected, to some extent at least, by recently enacted laws to regulate the practice of pharmacy by placing the responsibility squarely on the person dispensing the drug.

The proper enforcement of laws designed to regulate the practice of pharmacy in conjunction with pure-drugs laws should relieve physicians and the public of any doubt as to the composition, purity, quality, and strength of all drugs and medicinal preparations used in the treatment of disease. As these laws are enforced at the present time it is plainly evident that the methods of control are inadequate and do not serve to safeguard public health as well as they could or should.

Boards of health and other State and Federal officials intrusted with the enforcement of these laws should endeavor to call attention to the desirability of having druggists exercise a close scrutiny of the drugs and preparations included in their stock, to keep drugs, chemicals, and preparations in suitable containers, to throw away old or useless material, and to see that scales, weights, and measures are reliable and accurate under the conditions imposed upon them.

Some effort should also be made to see that drug stores are equipped with the necessary analytical apparatus with which to analyze or examine all supplies and thus assist in maintaining a more efficient control of the articles sold as medicine.

Consistent and efficient control of the identity, purity, and strength of all drugs and preparations as furnished the consumer would make for progress in the science of medicine and should prove to be an important factor in promoting public health.